Pigeon to the

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On a cold, February day in 1992, a Marine CH-46E helicopter crashed off the coast of Ventura, Calif. Eight of the nine Marines aboard escaped. The ninth, though, was not found and was presumed to be in the helicopter.

The task of recovering the missing body and salvaging the helicopter was assigned to the divers and crew of USS *Pigeon* (ASR 21), which was one of only two submarine-rescue and deep-ocean-salvage catamarans in the U.S. Navy in 1992. After a quick load-out of diving and sonar equipment from Deep Submergence Unit, San Diego, divers did work-up dives to acclimate themselves with the anticipated depths of the task ahead.

Crewmen aboard *Pigeon* searched for the downed helicopter for two days. Once they found it, the ship went into a modified, three-point moor, and divers prepared to make the first set of dives. They recovered the body of the missing Marine, then began salvaging the aircraft for delivery to NAS, North Island.

Although no formal instruction on operational risk management (ORM) existed yet, *Pigeon* divers applied ORM principles to everything they did. At the time, there was a chapter (now there are two) in the *U.S. Navy Diving Manual* devoted to identifying and controlling risk during diving operations. *Pigeon*'s diving officer and master diver used that guidance to plan the recovery operation. They also made sure their divers were

prepared for any changes that might occur, and it's a good thing they did, because the picture changed rapidly during one dive.

Divers found the helicopter upside down, in 145 feet of seawater, with its rotor hubs buried in 4 feet of mud and clay. Using a fire hose lowered from the ship, red and green divers were able to clear away the mud and clay and attach a wire-rope lifting sling around the rotor hubs.

As topside personnel lowered this sling to the bottom, it became entangled in red and green divers' umbilicals and their descent line. The divers reported the fouling to the master diver (acting as diving supervisor topside), who decided to lower the descent line, umbilicals, and lifting sling as a group. This action would let the divers try to untangle their lines.

When the cluster of line and hose arrived on the bottom, red and green diver reported that the lifting-sling wire had worked its way around both umbilicals, the descent line, and itself, forming several knots in the process. The divers worked to free the wire rope from the descent line and umbilicals, but it was slow and tedious work, given the poor visibility and cold water. To make matters worse, the end of a 30-minute planned dive was fast approaching.

Red and green divers finally freed the line and umbilicals from the wire rope, but they exceeded the time limit of the planned decompression schedule. Topside, the master diver decided to switch to a different table and schedule, a decision that would involve greater decompression time in the water. Because of these complications, the dive was aborted, and red and green divers prepared to return to the surface.

As the tenders pulled the divers toward the surface, red diver felt himself growing heavier—something was holding him back. He reported the problem to the diving supervisor, but, before anything could be done, red diver was pulled away from green diver's grasp by whatever was holding him back. The tenders immediately stopped their recovery efforts, and the master diver reassessed the situation.

Meanwhile, down below, red diver discovered that the descent line was preventing his ascent to the surface. Apparently, when topside had slacked the lines so the divers could free the lifting-sling wire, the descent line had become fouled on the

emergency bottle of air strapped to red diver's back. Something had to be done, and fast, because the limit was approaching for the new decompression schedule. It was the last table and schedule available for this depth of dive.

Thinking quickly, red diver flipped upside down in an effort to free himself, but the descent line still clung to his bottle. The master diver ordered the tenders to lower green diver, so he could free red diver, but green diver was unsuccessful. With the time limit about to expire, the master diver ordered green diver to cut the line with a knife. Because of the many knots in the fouled line, it took nearly 15 minutes to cut through the descent line and free red diver. Both divers were ready to travel back to the surface, but there was one problem: They had exceeded the decompression-time limit. An informed decision, taking into account all the risks involved, had to be made to avoid a mishap.

Keeping his cool, the master diver elected to call experts at the Naval Medical Research Institute (NMRI). At the time, the divers, doctors and scientists at NMRI were the ones who had written the Navy decompression tables. After hearing about the situation involving *Pigeon*, the NMRI scientists recommended following the current in-water schedule, then shifting to a treatment table (TT)-6 when the divers arrived on the surface. This plan would allow recompression treatment to start immediately, in the event it was needed. Because decompression would be omitted, there was a very real possibility that the divers could suffer from decompression sickness or an arterial gas embolism.

The master diver, acting on the advice of NMRI scientists, ordered red and green divers to ascend, all the while adhering to the in-water decompression schedule they had been using up to that point. Their ascent was uneventful, and the divers were brought up and over the side of *Pigeon* and placed in the recompression chamber to begin surface decompression using TT-6. Quarters were cramped inside the chamber, but both divers remained in good physical condition throughout the entire treatment.

Despite the changes that occurred during this dive, everyone stayed calm. Two days and many less-eventful dives later, the crew of *Pigeon* recovered the downed helicopter. The planning, training and risk assessment that went into the recovery operation undoubtedly averted a potential disaster.

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Divers and crewmen aboard *Pigeon* pose for a photographer once recovery efforts are complete.